MATHEMATICS Exam, High School entrance (8th grade), nationwide, june 2003

Every subject is required. You have 10 points for attending the exam: maximum grade 100. Work time is 2 hours. No calculators!

Part I (45 points)- Write only results on the exam paper

1. The result of the calculation 400:16 is equal to ... (5 pnts)
2. The real solution of the equation $2x - 24 = 0$ is equal to .... (5 pnts)
3. 35% of 40 is equal to ... (5 pnts)
4. The greatest common divisor of the numbers 39 and 65 is equal to ... (5 pnts)
5. The number greater by 28 than 15 is equal to ... (5 pnts).
6. In fig. 1, the triangles ABC, ACE and BCD are equilateral, and AB=4 cm.

a) The lenth of the segment DE is equal to .... (3 pnts)

b) The perimeter of the quadrilater ABDE is equal to .... (2 pnts).

7. Two hours have in total a number of ... minutes. (5 pnts)
8. A right circular cone has the generator of 9 cm and the radius of the base of 5 cm. The lateral area of the cone is equal to ... cm^2. (5 pnts)
9. In fig. 2, the length of the arc AB is 80^0 and the length of the arc DC is 100^0. Associate each letter of column A to the number of column B corresponding to the angle specified in column A. Write on the exam paper all the associations that express true mathematical statements.

A	B
a. the angle made by ADB has the value (2 pnts)	1. 120^0
b. the angle made by DAC has the value (2 pnts)	2. 40^0
c. the angle made by BPC has the value (1 pnts)	3. 50^0.
	4. 90^0.

Part II (45 points)- Write complete solutions on the exam paper

1. The father calculates that, 10 years ago his age was 9 times greater than that of his son and that, in 2 years, the age of his son will be 3 times as small as his.

a) What age is the son now? (6 pnts)

b) What age had the father when his son was born? (4 pnts)

2. Consider the function $f : \mathbf{R} \to \mathbf{R}$, $f(x) = ax + 2a + 1$, where a is a real number.

a) Calculate $f(-2)$ (3 pnts)

b) Calculate the real values of a knwoing that $f(1) \cdot f(-1) - 8 = 0$. (4 pnts)

c) For $a = 1$, represent the graph of the function f in a system of perpendicular axis. (4 pnts)

d) Calculate the distance from the point $M(0; -5)$ to the straight line that represents the graph of the function f. (4 pnts)

3. In fig.3, ABCA'B'C' is a right angle prism with base ABC which is an equilateral triangle. The volume of the prism is equal to $54\sqrt{3}cm^3$. The sides AB and BB' are equal in length, and M is the middle of AB.

a) Complete on the exam paper the drawing in fig. 3 with the triangle MCB'. (4 pnts)

b) Calculate the length of the side AB. (4 pnts)

c) Knowing that AB=6cm, calculate the distance from B' to the line CM. (4 pnts)

d) Calculate the angle made by the planes (MCB') and (ABB') (4 pnts)
e) Calculate the distance from the point A' to the plane (MCB')